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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,553	01/04/2002	Jeong-Ho Kim	LEE OP1008	7131
7990	01/23/2004			
Norman P. Soloway HAYES, SOLOWAY, HENNESSEY, GROSSMAN & HAGE, P.C. 175 Canal Street Manchester, NH 03101			EXAMINER HASSANZADEH, PARVIZ	
			ART UNIT 1763	PAPER NUMBER

DATE MAILED: 01/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No. 10/038,553	Applicant(s) KIM ET AL.
Examiner Parviz Hassanzadeh	Art Unit 1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 May 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) 1-22 and 32-34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 23-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-34 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-22 and 32-34, drawn to a method, classified in class 438, subclass 710.
- II. Claims 23-31, drawn to an apparatus, classified in class 156, subclass 345.39.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used for deposition of coating of a semiconductor device.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Norman P. Soloway on July 2, 2003 a provisional election was made with traverse to prosecute the invention of Group II, apparatus claims 23-31. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-22 and 32-34 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the

application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Drawings

Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 23, 26, 28-31 are rejected under 35 U.S.C. 102(b) as being anticipated by

Hotomi (US Patent No. 4,828,369).

Hotomi teaches a plasma processing apparatus (Fig. 2) comprising:

a bell jar 2 which can be evacuated by a vacuum pump (a chamber that can be maintained in a vacuum state);

a substrate holder 4 for supporting a substrate 3 (a substrate mount in the chamber for mounting a silicon substrate);

a gas inlet 8 for introducing a carrier gas such as H₂, Ar to generate a plasma (a first processing gas inlet for introducing a carrier gas into the chamber to generate and maintain plasma);

a high-frequency power source 6 coupled to a coil 7 for converting the carrier gas into plasma (a plasma generator for forming plasma out of the first processing gas);

mesh electrodes 12, 13 coupled to DC power source 16 and 17 for collecting and capturing electrons and charged particles in the plasma and thus allowing only neutral excited species such as neutral radicals reach the substrate (a filter between the plasma generator and the substrate mount for passing only radicals to the substrate); and

gas inlets 9, 10 and 11 for introducing material gases into the chamber (a second processing gas inlet between the plasma generator and the filter for introducing a second process gas into the chamber) (column 9, line 47 through column 11, line19; and column 12, lines27-33).

Further regarding claim 26: as shown in Fig. 2 the mesh electrode 13 may be grounded via a switch.

Further regarding claims 28, 29 and 31: the carrier gas may be hydrogen or nitrogen and the material gas may be BCl₃ (column 9, lines 47-48; column 15, lines 43-53). Further, the particular type of gas used is a process limitation rather than an apparatus limitation, and the recitation of a particular type of gas does not limit an apparatus claim, see *In re Casey*, 152 USPQ 235; *In re Rishoi*, 94 USPQ 71; *In re Young*, 25 USPQ 69; *In re Dulberg*, 129 USPQ 348; *Ex parte Thibault*, 64 USPQ 666; and *Ex parte Masham*, 2 USPQ2d 1647. This rejection is based on the fact the apparatus structure taught by Hotomi has the inherent capability of being used in the manner intended by the Applicant. When a rejection is based on the inherency, a rejection under 35 U.S.C. 102 or U.S.C. 103 is appropriate. (See *In re Fitzgerald* 205 USPQ 594 or MPEP 2112).

Further regarding claim 30: the material gases may be introduced into the process chamber via gas inlet 9, 10 and 11 (column 10, lines 19-58).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hotomi (US Patent No. 4,828,369) in view of Mizutani et al (US Patent No. 5,284,544).

Hotomi teaches all limitations of the claims as discussed above except for the plasma generator is microwave generator.

Mizutani et al teach a plasma processing apparatus (Fig. 3) for processing a substrate using neutral species, wherein a waveguide 21 coupled to a microwave power source is used for generating plasma (column 9, lines 26-39).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ a microwave generator as taught by Mizutani et al in the apparatus of Hotomi as an art recognized equivalent for the same purpose of generating a plasma.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hotomi (US Patent No. 4,828,369) in view of Shang et al (US Patent No. 6,055,927).

Hotomi teaches all limitations of the claims as discussed above except for a wall heat jacket for maintaining the walls of the chamber at a predetermined temperature to prevent the radicals from sticking to the walls of the chamber and forming a byproduct layer and to concentrate the radicals on the surface of the silicon substrate.

Shang et al teach a plasma processing apparatus (Fig. 1) wherein the walls of the chamber 10 is heated for example by a recirculating fluid supply 61 in order to prevent sticking of gas particles to the interior of the walls 70 of the chamber 10 (column 4, lines 51 through column 5, line 17).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the heating mechanism as taught by Shang et al in the apparatus of Hotomi in order to prevent accumulating of gas particles on the interior surface of the process chamber.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hotomi (US Patent No. 4,828,369) in view of Yin et al (US Patent No. 6,352,049 B1).

Hotomi teaches all limitations of the claims as discussed above except for the filter is a grid to which an AC voltage is applied.

Yin et al teach a plasma processing apparatus wherein charge plasma species are filtered using a variety of filtering mechanism including a grid 316b (Fig. 7B) coupled to a voltage source 710 wherein the voltage source may an RF power source (column 16, lines 4-49).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize a voltage power source as taught by Yin et al in the apparatus of Hotomi in order to filter charge species from plasma.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kawakami et al (US Patent No. 5,192,717) teach a plasma processing apparatus (Fig. 1) including a mesh electrode 103 coupled to an RF power source for controlling the energy of ions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Parviz Hassanzadeh whose telephone number is (571)272-1435. The examiner can normally be reached on Tuesday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (571)272-1439. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0661.

P. Hassanzadeh
Parviz Hassanzadeh
Primary Examiner
Art Unit 1763

January 8, 2004